KRAMER ELECTRONICS LTD.

USER MANUAL

MODEL:

FC-49
DVI / Audio to HDMI Converter

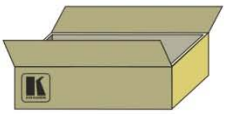
P/N: 2900-000286 Rev 5

FC-49 Quick Start Guide

This guide takes you through a basic installation and first-time use of your **FC-49**.
For more detailed information, see the **FC-49** user manual. You can download the latest manual at http://www.kramerelectronics.com.

Step 1: Check what's in the box

- The **FC-49** DVI / Audio to HDMI Converter
- 1 Power Adapter
- Mounting brackets
- 4 Rubber feet
- 1 Quick start guide
- 1 User Manual



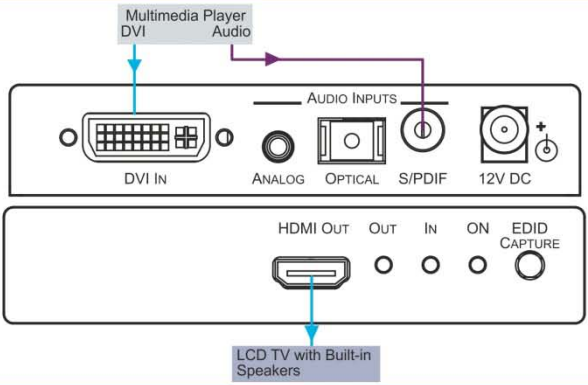
Save the original box and packaging materials in case your Kramer product needs to be returned to the factory for service.

Step 2: Install the FC-49

Mount the machine in a rack or place on a table.

Step 3: Connect inputs and output

Always switch OFF the power on each device before connecting it to your **FC-49**.



For best results, we recommend that you always use Kramer high-performance cables to connect AV equipment to the **FC-49**.

Step 4: Connect the power

Connect the 12V DC power adapter to the **FC-49** and plug the adapter into the mains electricity.

Step 5: Acquire the EDID

1. Connect the power supply.
2. Connect the new output display (or keep disconnected to acquire the default EDID).
3. Press and hold the EDID CAPTURE button until the green IN LED starts blinking and then release the button.

The EDID is acquired after the LED stops blinking

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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Our 1,000-plus different models now appear in 11 groups that are clearly defined by function: GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters and GROUP 11: Sierra Products.

Congratulations on purchasing your Kramer TOOLS **FC-49** DVI / Audio to HDMI Converter, which is ideal for:

- Home theater, presentation and multimedia applications
- Rental and staging

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high performance high resolution cables

Go to http://www.kramerelectronics.com to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

2.1 Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality
- Position your Kramer **FC-49** away from moisture, excessive sunlight and dust

Caution: No operator serviceable parts inside the unit

Warning: Use only the Kramer Electronics input power wall adapter that is provided with the unit

Warning: Disconnect the power and unplug the unit from the wall before installing

3 Overview

The Kramer **FC-49** DVI / Audio to HDMI Converter is a high−quality format converter and embedder for DVI and audio signals. It converts a DVI signal and embeds an unbalanced stereo, S/PDIF or TOSLINK® audio signal to an HDMI output.

The **FC-49** DVI / Audio to HDMI Converter features:

- Max. Data Rate - Up to 1.65Gbps
- HDCP Compliance
- HDTV Compatibility
- Auto Format Detection - Digital RGB or YPbPr
- Input - DVI−D signal on a DVI−I connector
- I-EDIDPro™ Kramer Intelligent EDID Processing™ - Intelligent EDID handling and processing algorithm ensures Plug and Play operation for HDMI systems

In addition, the **FC-49** DVI / Audio to HDMI Converter:

- Adds HDMI output capability to your DVI source so that, for example, an HDMI television can be used with your DVI source (For example, the DVI source can also be the DVI graphics output of a PC as well as its audio signal) with sound
- Includes automatic audio input detection. If a digital input (S/PDIF or TOSLINK®) is detected, the **FC-49** selects the digital input. If no digital input is detected, the machine selects the analog input. **Note that S/PDIF and TOSLINK® inputs may not be connected simultaneously**
- Supports a TOSLINK® sample rate of 44.1kHz and 48kHz
- Is housed in a Kramer TOOLS™ enclosure.
  Compact Kramer TOOLS™ - three units can be rack mounted side−by−side in a 1U rack space with the optional RK−3T rack adapter

3.1 About HDCP

The High-Bandwidth Digital Content Protection (HDCP) standard developed by Intel, protects digital video and audio signals transmitted over DVI or HDMI connections between two HDCP-enabled devices to eliminate the reproduction of copyrighted material. To protect copyright holders (such as movie studios) from having their programs copied and shared, the HDCP standard provides for the secure and encrypted transmission of digital signals.

3.2 Defining EDID

The Extended Display Identification Data (EDID) is a data-structure provided by a display, to describe its capabilities to a graphics card (that is connected to the display's source). The EDID enables the **FC-49** to "know" what kind of monitor is connected to the output. The EDID includes the manufacturer's name, the product type, the timing data supported by the display, the display size, luminance data and (for digital displays only) the pixel mapping data.

EDID is defined by a standard published by the Video Electronics Standards Association (VESA).

3.3 About HDMI—General Description

High-Definition Multimedia Interface (HDMI) is an uncompressed all-digital audio/video interface, widely supported in the entertainment and home cinema industry. HDMI ensures an all-digital rendering of video without the losses associated with analog interfaces and their unnecessary digital-to-analog conversions. It delivers the maximum high-definition image and sound quality in use today. Note that Kramer Electronics Limited is an HDMI Adopter and an HDCP Licensee.

HDMI, the HDMI logo and High-Definition Multimedia Interface are trademarks or registered trademarks of HDMI licensing LLC.

In particular, HDMI:

- Provides a simple interface between any audio/video source, such as a set-top box, DVD player, or A/V receiver and video monitor, such as a digital flat LCD / plasma television (DTV), over a single lengthy cable

  SIMPLICITY - With video and multi-channel audio combined into a single cable, the cost, complexity, and confusion of multiple cables currently used in A/V systems is reduced

  LENGTHY CABLE - HDMI technology has been designed to use standard copper cable construction at up to 15m

- Supports standard, enhanced, high-definition video, and multi-channel digital audio on a single cable

  MULTI-CHANNEL DIGITAL AUDIO - HDMI supports multiple audio formats, from standard stereo to multi-channel surround-sound. HDMI has the capacity to support Dolby 5.1 audio and high-resolution audio formats

- Transmits all ATSC HDTV standards and supports 8-channel digital audio, with bandwidth to spare to accommodate future enhancements and requirements

- Benefits consumers by providing superior, uncompressed digital video quality via a single cable, and user-friendly connector

  HDMI provides the quality and functionality of a digital interface while also supporting uncompressed video formats in a simple, cost-effective manner

- Is backward-compatible with DVI (Digital Visual Interface)

- Supports two-way communication between the video source (such as a DVD player) and the digital television, enabling new functionality such as automatic configuration and one-button play

- Has the capacity to support existing high-definition video formats (720p, 1080i, and 1080p/60), standard definition formats such as NTSC or PAL, as well as 480p and 576p

3.4 Defining the FC-49 DVI / Audio to HDMI Converter

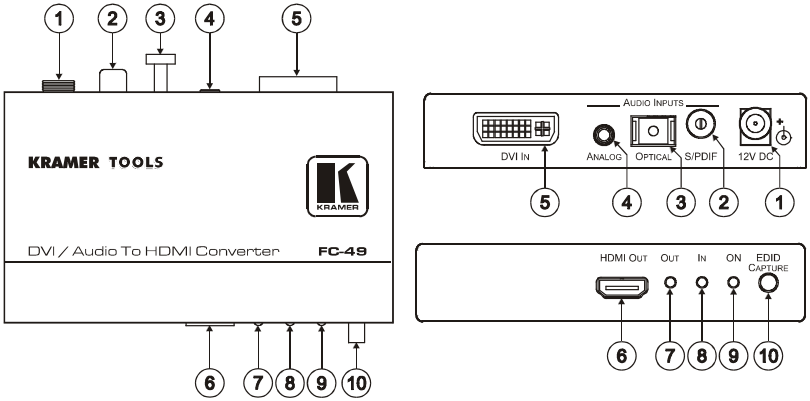

Figure 1: FC-49 DVI / Audio to HDMI Converter

#	Feature		Function
1	*12V DC*		+12V DC connector for powering the unit
2	*AUDIO INPUTS*	*S/PDIF* RCA Connector	Connects to the digital audio source
3		*OPTICAL* TosLink® Connector	Connects to the digital audio source
4		*ANALOG* 3.5mm Mini Jack Connector	Connects to the analog audio source
5	*DVI IN* Connector		Connects to the DVI source
6	*HDMI OUT* Connector		Connects to the HDMI acceptor
7	*OUT* LED		Illuminates to indicate that a display is connected
8	*IN* LED		Illuminates to indicate a signal at the input
9	*ON* LED		Illuminates when receiving power
10	*EDID CAPTURE Button*		Press and hold to acquire EDID

The audio inputs are automatically detected: if a digital input (S/PDIF or TOSLINK®) is detected, the machine selects the digital input. If no digital input is detected, the machine selects the analog input. **Note that S/PDIF and TOSLINK® inputs may not be connected simultaneously**.

4 Connecting the FC-49 DVI / Audio to HDMI Converter

Always switch off the power to each device before connecting it to your **FC-49**. After connecting your **FC-49**, connect its power and then switch on the power to each device.

To connect the **FC-49**, as illustrated in the example in Figure 2 do the following:

1. Connect the HDMI OUT connector to the HDMI acceptor (for example, an LCD TV with built-in speakers).
2. Connect the DVI source, for example, a multimedia player (or a PC) to the:
   - DVI IN connector
   - S/PDIF (digital audio) RCA IN connector (or you can connect the audio source to the ANALOG or OPTICAL audio connector)
3. Connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity (not illustrated in Figure 2).

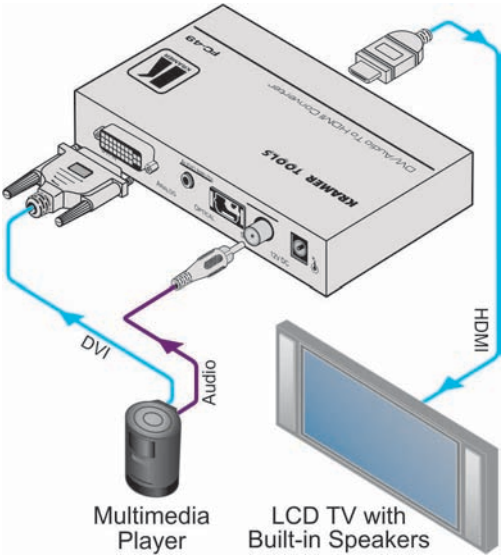

Figure 2: Connecting the FC-49 DVI / Audio to HDMI Converter

5 Acquiring EDID

To acquire a new EDID, do the following:

1. Connect the power supply.
2. Connect the new output display (or keep it disconnected to acquire the default EDID).
3. Press and hold the EDID CAPTURE button until the green IN LED starts blinking, and then release the button.

The EDID is acquired after the IN LED stops blinking.

6 Technical Specifications

INPUTS:	1 DVI On a DVI-I connector. Note that only the digital signal (DVI-D) is available on the DVI connector, 1.2Vpp on a DVI Molex 24-pin female connector; DDC signal 5Vpp (TTL) 1 S/PDIF (digital audio) on an RCA connector 1 ANALOG on a 3.5mm mini jack connector 1 TOSLINK® optical connector
OUTPUT:	HDMI Connector
OPERATION FREQUENCY:	Supports up to 1.65Gbps (UXGA, 1080p)
COMPLIANCE WITH HDMI STANDARD:	Supports DVI 1.0, HDMI, and HDCP (compliant with HDCP 1.1 and downward compatible with HDCP 1.0) 1.0
TOSLINK SAMPLE RATE:	44.1kHz and 48kHz
CONTROLS:	EDID button
INDICATOR LED:	ON, IN, OUT
POWER SOURCE:	12V DC, 190mA
OPERATING TEMPERATURE:	0° to +55°C (32° to 131°F)
STORAGE TEMPERATURE:	-45° to +72°C (-49° to 162°F)
HUMIDITY:	10% to 90%, RHL non-condensing
DIMENSIONS:	12cm x 7.2cm x 2.4cm (4.73" x 2.83" 0.95") W, D, H
WEIGHT:	0.3kg (0.6lbs) approx.
ACCESSORIES:	Power supply, bracket installation kit
OPTIONS:	RK-3T 19" rack adapter
Specifications are subject to change without notice	

7 Default EDID

Monitor #2 [Real-time 0x0031]
  Model name..... FC-49
  Manufacturer..... KRM
  Plug and Play ID..... KRM0000
  Serial number..... 1
  Manufacture date..... 2006, ISO week 12
  Filter driver..... None

  EDID revision..... 1.3
  Input signal type..... Digital (DVI)
  Color bit depth..... Undefined
  Display type..... RGB color
  Screen size..... 700 x 390 mm (31.5 in)
  Power management..... Not supported
  Extension blocs..... 1 (CEA-EXT)

  DDC/CI..... Not supported

Color characteristics
  Default color space..... Non-sRGB
  Display gamma..... 2.20
  Red chromaticity..... Rx 0.640 - Ry 0.341
  Green chromaticity..... Gx 0.286 - Gy 0.610
  Blue chromaticity..... Bx 0.146 - By 0.069
  White point (default).... Wx 0.284 - Wy 0.293
  Additional descriptors... None

Timing characteristics
  Horizontal scan range.... 30-91kHz
  Vertical scan range..... 55-85Hz
  Video bandwidth..... 160MHz
  CVT standard..... Not supported
  GTF standard..... Supported
  Additional descriptors... None
  Preferred timing..... Yes
  Native/preferred timing.. 1280x720p at 60Hz (16:9)
    Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync
  Detailed timing #1..... 720x480p at 60Hz (16:9)
    Modeline..... "720x480" 27.000 720 736 798 858 480 489 495 525 -hsync -vsync

Standard timings supported
    720 x 400p at 70Hz - IBM VGA
    640 x 480p at 60Hz - IBM VGA
    640 x 480p at 67Hz - Apple Mac II
    640 x 480p at 72Hz - VESA
    640 x 480p at 75Hz - VESA
    800 x 600p at 56Hz - VESA
    800 x 600p at 60Hz - VESA
    800 x 600p at 72Hz - VESA
    800 x 600p at 75Hz - VESA
    832 x 624p at 75Hz - Apple Mac II
   1024 x 768p at 60Hz - VESA
   1024 x 768p at 70Hz - VESA
   1024 x 768p at 75Hz - VESA
   1280 x 1024p at 75Hz - VESA
   1600 x 1200p at 60Hz - VESA STD
   1280 x 960p at 85Hz - VESA STD
   1360 x 765p at 85Hz - VESA STD
   1024 x 768p at 85Hz - VESA STD
    800 x 600p at 85Hz - VESA STD
    640 x 480p at 85Hz - VESA STD

EIA/CEA-861 Information
  Revision number..... 3
  IT underscan..... Supported
  Basic audio..... Supported
  YCbCr 4:4:4..... Not supported
  YCbCr 4:2:2..... Not supported

Native formats..... 1
Detailed timing #1..... 720x480p at 60Hz (4:3)
Modeline..... "720x480" 27.000 720 736 798 858 480 489 495 525 -hsync -vsync
Detailed timing #2..... 1920x1080i at 60Hz (16:9)
Modeline..... "1920x1080" 74.250 1920 2008 2052 2200 1080 1084 1094 1124 interlace +hsync +vsync

CE video identifiers (VICs) - timing/formats supported
640 x 480p at 60Hz - Default (4:3, 1:1)
720 x 480p at 60Hz - EDTV (4:3, 8:9)
720 x 480p at 60Hz - EDTV (16:9, 32:27)
1280 x 720p at 60Hz - HDTV (16:9, 1:1) [Native]
1920 x 1080i at 60Hz - HDTV (16:9, 1:1)
NB: NTSC refresh rate = (Hz*1000)/1001

CE audio data (formats supported)
LPCM 2-channel, 16/20/24 bit depths at 32/44/48 kHz

CE speaker allocation data
Channel configuration.... 2.0
Front left/right..... Yes
Front LFE..... No
Front center..... No
Rear left/right..... No
Rear center..... No
Front left/right center.. No
Rear left/right center... No
Rear LFE..... No

CE vendor specific data (VSDB)
IEEE registration number. 0x000C03
CEC physical address..... 1.0.0.0
Maximum TMDS clock..... 165MHz

Report information
Date generated..... 29/05/2012
Software revision..... 2.60.0.964
Data source..... Real-time 0x0031
Operating system..... 5.1.2600.2.Service Pack 3

Raw data
00,FF,FF,FF,FF,FF,FF,00,2E,4D,00,00,01,00,00,00,0C,10,01,03,81,46,27,78,0B,D5,7C,A3,57,49,9C,25,
11,48,4B,BF,EF,00,A9,40,81,59,8B,D9,61,59,45,59,31,59,01,01,01,01,01,1D,00,72,51,D0,1E,20,6E,28,
55,00,C4,8E,21,00,00,1E,8C,0A,D0,8A,20,E0,2D,10,10,3E,96,00,C4,8E,21,00,00,18,00,00,00,FC,00,46,
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02,03,18,C1,45,01,02,03,84,05,23,09,07,07,83,01,00,00,65,03,0C,00,10,00,8C,0A,D0,8A,20,E0,2D,10,
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LIMITED WARRANTY

The warranty obligations of Kramer Electronics for this product are limited to the terms set forth below:

What is Covered

This limited warranty covers defects in materials and workmanship in this product.

What is Not Covered

This limited warranty does not cover any damage, deterioration or malfunction resulting from any alteration, modification, improper or unreasonable use or maintenance, misuse, abuse, accident, neglect, exposure to excess moisture, fire, improper packing and shipping (such claims must be presented to the carrier), lightning, power surges, or other acts of nature. This limited warranty does not cover any damage, deterioration or malfunction resulting from the installation or removal of this product from any installation, any unauthorized tampering with this product, any repairs attempted by anyone unauthorized by Kramer Electronics to make such repairs, or any other cause which does not relate directly to a defect in materials and/or workmanship of this product. This limited warranty does not cover cartons, equipment enclosures, cables or accessories used in conjunction with this product.

Without limiting any other exclusion herein, Kramer Electronics does not warrant that the product covered hereby, including, without limitation, the technology and/or integrated circuit(s) included in the product, will not become obsolete or that such items are or will remain compatible with any other product or technology with which the product may be used.

How Long Does this Coverage Last

Seven years as of this printing; please check our Web site for the most current and accurate warranty information.

Who is Covered

Only the original purchaser of this product is covered under this limited warranty. This limited warranty is not transferable to subsequent purchasers or owners of this product.

What Kramer Electronics will do

Kramer Electronics will, at its sole option, provide one of the following three remedies to whatever extent it shall deem necessary to satisfy a proper claim under this limited warranty:

1. Elect to repair or facilitate the repair of any defective parts within a reasonable period of time, free of any charge for the necessary parts and labor to complete the repair and restore this product to its proper operating condition. Kramer Electronics will also pay the shipping costs necessary to return this product once the repair is complete.
2. Replace this product with a direct replacement or with a similar product deemed by Kramer Electronics to perform substantially the same function as the original product.
3. Issue a refund of the original purchase price less depreciation to be determined based on the age of the product at the time remedy is sought under this limited warranty.

What Kramer Electronics will not do Under This Limited Warranty

If this product is returned to Kramer Electronics or the authorized dealer from which it was purchased or any other party authorized to repair Kramer Electronics products, this product must be insured during shipment, with the insurance and shipping charges prepaid by you. If this product is returned uninsured, you assume all risks of loss or damage during shipment. Kramer Electronics will not be responsible for any costs related to the removal or re-installation of this product from or into any installation. Kramer Electronics will not be responsible for any costs related to any setting up this product, any adjustment of user controls or any programming required for a specific installation of this product.

How to Obtain a Remedy under this Limited Warranty

To obtain a remedy under this limited warranty, you must contact either the authorized Kramer Electronics reseller from whom you purchased this product or the Kramer Electronics office nearest you. For a list of authorized Kramer Electronics resellers and/or Kramer Electronics authorized service providers, please visit our web site at www.kramerelectronics.com or contact the Kramer Electronics office nearest you.

In order to pursue any remedy under this limited warranty, you must possess an original, dated receipt as proof of purchase from an authorized Kramer Electronics reseller. If this product is returned under this limited warranty, a return authorization number, obtained from Kramer Electronics, will be required. You may also be directed to an authorized reseller or a person authorized by Kramer Electronics to repair the product.

If it is decided that this product should be returned directly to Kramer Electronics, this product should be properly packed, preferably in the original carton, for shipping. Cartons not bearing a return authorization number will be refused.

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IF ANY PRODUCT TO WHICH THIS LIMITED WARRANTY APPLIES IS A "CONSUMER PRODUCT" UNDER THE MAGNUSON-MOSS WARRANTY ACT (15 U.S.C.A. §2301, ET SEQ.) OR OTHER APPICABLE LAW, THE FOREGOING DISCLAIMER OF IMPLIED WARRANTIES SHALL NOT APPLY TO YOU, AND ALL IMPLIED WARRANTIES ON THIS PRODUCT, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR THE PARTICULAR PURPOSE, SHALL APPLY AS PROVIDED UNDER APPLICABLE LAW.

Other Conditions

This limited warranty gives you specific legal rights, and you may have other rights which vary from country to country or state to state.

This limited warranty is void if (i) the label bearing the serial number of this product has been removed or defaced, (ii) the product is not distributed by Kramer Electronics or (iii) this product is not purchased from an authorized Kramer Electronics reseller. If you are unsure whether a reseller is an authorized Kramer Electronics reseller, please visit our Web site at www.kramerelectronics.com or contact a Kramer Electronics office from the list at the end of this document.

Your rights under this limited warranty are not diminished if you do not complete and return the product registration form or complete and submit the online product registration form. Kramer Electronics thanks you for purchasing a Kramer Electronics product. We hope it will give you years of satisfaction.

For the latest information on our products and a list of Kramer distributors, visit our Web site where updates to this user manual may be found.

We welcome your questions, comments, and feedback.
Web site: www.kramerelectronics.com
E-mail: info@kramerel.com

SAFETY WARNING
Disconnect the unit from the power supply before opening and servicing

PN: 2900-000286 Rev: 5